REMARKS

Applicant thanks the Examiner for acknowledging Applicant's claim to foreign priority and receipt of the certified copy of the priority document. Responsive to the Office Action mailed on March 21, 2005 in the above-referenced application, Applicant respectfully requests amendment of the above-identified application in the manner identified above and that the patent be granted in view of the arguments presented. No new matter has been added by this amendment.

Present Status of Application

Claims 11-20 are withdrawn from consideration. Claim 21 stands rejected under 35 U.S.C. 102(e) as being anticipated by Applicant's Admitted Prior Art (AAPA). Claims 1-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of JaiPrakash et al (US 6,605,504). Claim 21 is objected to for informalities.

In this paper, claim 1 is amended to correct grammatical errors and recite novel and non-obvious features of the present invention, as discussed in further detail below. Support for the amendments can be found in Figs. 3C to 3G and the related text of the specification. Claim 21 is amended to overcome the objections. In this regard, Applicant submits that the introduction of the element "interval layer" should be preceded by the indefinite article "an", not "the" as suggested in the office action. Claims 7, 11 and 17 are amended to correct grammatical informalities. New claim 22 is added. Support for the new claim may be found in Fig. 3J and the related text of the specification. Claim 8 is canceled. Fig. 2C is amended as described in further detail below. Thus, after entry of this amendment, claims 1-7 and 9-22 are pending, wherein claims 11-20 are withdrawn from consideration.

Reconsideration of this application is respectfully requested in light of the amendments and the remarks contained below.

Drawings

Fig. 2C is amended to delete reference number 22, which refers to the silicon layer 22 formed in the step illustrated in Fig. 2D. Applicant submits that no new matter has been added by the amendments to the drawings.

Rejections Under 102(e)

Claim 21 stands rejected under 35 U.S.C. 102(e) as being anticipated by AAPA. Applicant respectfully traverses the rejection for at least the reasons as follow.

35 U.S.C. 102(e) reads in its relevant part:

> ... the invention was described in - (1) ***an application for patent, published under section 122(b), by another*** filed in the United States before the invention by the applicant for patent or (2) ***a patent granted on an application for patent by another*** filed in the United States before the invention by the applicant for patent ...

Thus, prior art under 102(e) must be either a U.S. published patent application by another or a granted patent by another. It is noted that what the Examiner identifies as AAPA does not fit into either of these categories.

AAPA does not teach or suggest a method for controlling the upper width of trench comprising the step of ***removing the interval layer***, exposing the sidewall of the trench over the conductive layer, as recited in claim 21.

To anticipate a claim, a reference must teach every element of the claim. In this regard, the Federal Circuit has held:

> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).
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> "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

In the rejection, the Examiner states that AAPA discloses a method of forming a trench comprising the step of removing the interval layer 22 (Fig. 2D) or removing the interval layer 34 (Fig. 2E), exposing a sidewall of the trench over the conductive layer (Fig. 2E).

However, with reference to Figs. 2D and 2E, it is clear that both layers 22 and 34 referred to by the Examiner are ***recessed***, not ***removed*** as recited in claim 21. Applicant further directs the Examiner's attention to page 3, lines 19-30 of the present application describing AAPA.

Applicant therefore submits that AAPA fails to teach or suggest all of the limitations recited in claim 21. For at least this reason, it is Applicant's belief that claim 21 is allowable over the cited reference.

Rejections Under 35 U.S.C. 103(a)

Claims 1-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of JaiPrakash et al. To the extent that the grounds of the rejections may be applied to the claims now pending in this application, they are respectfully traversed.

MPEP 2142 reads in part:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In connection with the third criteria, MPEP 2143.03 goes on the state:

> To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580

(CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

As amended, claim 1 recites a method for controlling the top width of a trench, comprising the steps of:

providing a substrate, having a trench formed therein;

forming a conductive layer in a portion of the trench;

forming an interval layer in a portion of the trench, wherein the interval layer is formed over the conductive layer;

forming a sacrificial layer on the sidewall of a top portion of the trench and on the interval layer;

etching the sacrificial layer to remove a portion of the sacrificial layer on the interval layer;

removing the interval layer to expose the sidewall of the trench between the remaining sacrificial layer and the conductive layer; and

oxidizing the sacrificial layer and the exposed sidewall of the trench to form a first silicon dioxide layer.

Whether taken alone or in combination, AAPA and JaiPrakash et al fail to teach or suggest a method for controlling the top width of a trench, comprising the step of ***removing the interval layer*** to expose the sidewall of the trench between the remaining sacrificial layer and the conductive layer, as recited in claim 1.

In the rejection of claim 1, the Examiner relies on AAPA to disclose a method of forming a trench comprising the step of removing the interval layer 22 (fig. 2D) exposing a sidewall of the trench over the conductive layer (fig. 2E).

However, as noted in connection with claim 21, it is clear from Figs. 2D and 2E that layer 22 referred to by the Examiner is ***recessed***, not ***removed*** as recited in claim 1. Applicant further

directs the Examiner's attention to page 3, lines 19-30 of the present application describing AAPA.

Applicant therefore submits that even when taken in combination, AAPA and JaiPrakash et al fail to teach or suggest all of the limitations recited in claim 1. For at least this reason, it is Applicant's belief that claim 1 is allowable over the cited reference. Insofar as claims 2-10 and 22 depend from claim 1, it is Applicant's belief that these claims are also in condition for allowance.

Whether taken alone or in combination, AAPA and JaiPrakash et al fail to teach or suggest a method for controlling the top width of a trench, comprising the steps of forming a sacrificial layer on the sidewall of a top portion of the trench and on the interval layer, etching the sacrificial layer to remove a portion of the sacrificial layer on the interval layer, and removing the interval layer to expose the sidewall of the trench between the remaining sacrificial layer and the conductive layer, as recited in claim 1.

The Examiner relies upon sacrificial layer 156 of JaiPrakash et al, which the Examiner takes to include layers 150, 140 and 154, as the sacrificial layer recited in claim 1. Presumably, when combined with AAPA, this layer would be formed on the interval layer (fill material 116 in JaiPrakash et al).

It is noted, however, that in JaiPrakash et al, the portion of layer 156 formed on the fill material 116 is not removed. Namely, with reference to Figs. 12 and 13 of JaiPrakash et al, it is clear that only the portion of layer 156 on the sidewalls is etched, not the portion of layer 156 on fill material 116. In this regard, in column 7, lines 49-56, JaiPrakash et al teach:

> FIG. 12 illustrates another step in the process of forming a vertical memory cell, wherein an insulator 160 (e.g., TTO) is deposited or otherwise formed within the trench 106 along the bottom of the upper region C. ***The insulator 160 preferably covers the sacrificial layer 156 that is on the top surface 118 of the capacitor fill material 116***, the strap fill material 140, and any additional fill material 154.

Thus, in JaiPrakash et al, an insulator 160 is formed to cover the sacrificial layer 156 that is on the top surface of fill material 116. In other words, this portion of the sacrificial layer is not removed.

Furthermore, since the portion of the sacrificial layer on the fill material is not removed in JaiPrakash et al, the following step of removing the interval layer to expose the sidewall of the trench between the remaining sacrificial layer and the conductive layer is also not taught or suggested by the reference.

Applicant therefore submits that even when taken in combination, AAPA and JaiPrakash et al fail to teach or suggest all of the limitations recited in claim 1. For at least this reason, it is Applicant's belief that claim 1 is allowable over the cited reference. Insofar as claims 2-10 and 22 depend from claim 1, it is Applicant's belief that these claims are also in condition for allowance.

Withdrawn Claims 11-20

As noted by the Examiner in the election of species requirement mailed on December 6, 2004, upon allowance of a generic claim, Applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of the generic claim as provided by 37 CFR 1.141.

Applicant submits that claim 21 is a generic claim and, for the reasons discussed above, allowable over the cited references. Applicant further submits that claim 11 includes all the limitations of claim 21. Applicant therefore requests that claim 11, and claims 12-20 depending there from, be considered by the Examiner upon the allowance of claim 21.

Conclusion

The Applicant believes that the application is now in condition for allowance and respectfully requests so.

Respectfully submitted,

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AMENDMENTS TO THE DRAWINGS

The attached one (1) sheet of drawings replaces the original sheet for Fig. 2C and includes changes to Fig. 2C.

Attachment: Replacement Sheets (1)